

[0029] FIGS. 18A-E are partial front elevation views of the elements of a garment system including differently shaped or sized male closure members.

LIST OF DRAWING REFERENCE NUMERALS

- [0030] 20 closure
- [0031] 30 male member
- [0032] 32 bar
- [0033] 33 ball
- [0034] 34 flat front surface
- [0035] 36 male exterior side
- [0036] 40 female member
- [0037] 42 trough
- [0038] 43 concave region
- [0039] 44 flat rear surface
- [0040] 46 female exterior side
- [0041] 47 sidewall
- [0042] 48 curved end
- [0043] 49 female front surface
- [0044] 50 detent
- [0045] 60 flange
- [0046] 62 alignment bar
- [0047] 63 reinforcement bar
- [0048] 70 recesses
- [0049] 500 garment
- [0050] 510 first end
- [0051] 520 second end
- [0052] 600 primary garment piece
- [0053] 700 secondary garment piece

DETAILED DESCRIPTION OF THE INVENTION

[0054] Referring initially to FIG. 1, there is illustrated a reduced front elevation view of a thin garment closure 20 in a closed position and connected to a garment 500. Closure 20 includes a male member 30 and a female member 40 (see also FIGS. 4 & 10). Garment 500 has a first end 510 and a second end 520 which are connectable by means of closure 20. Closure 20 is particularly suited for use with garments such as brassieres, lingerie, and swimwear, however its utility is not limited to these applications. In an embodiment, the closure is a front closure for a brassiere, where first and second ends 510 and 520 of garment 500 are to be joined between two brassiere cups. In another embodiment, the closure is a brassiere shoulder strap fastener and first and second garment ends 510 and 520 include one end of a brassiere shoulder strap and one of either material above a brassiere cup or material at the top of a brassiere back strap. In another embodiment, the closure is a back closure for a brassiere, where first and second ends 510 and 520 of garment 500 are two ends of a back strap.

[0055] FIG. 2 is a front elevation view of closure 20 and FIG. 3 is a cross-sectional view along the line 3-3 of FIG. 2. Male member 30 and female member 40 have, respectively, male and female exterior sides 36 and 46. First end 510 of garment 500 is connected to male exterior side 36 and second end 520 is connected to female exterior side 46 (see also FIG. 1). In the shown embodiment, ends 510 and 520 are connected, respectively, to exterior sides 36 and 46 of closure 20 by feeding the fabric of each garment end through a loop in the corresponding exterior side and stitching the fabric of the garment end to itself (as indicated by the dashed lines of FIG. 1). Ends 510 and 520 of garment 500 may be

connected to exterior sides 36 and 46 of closure 20 by other methods well known in the art, including simply passing the end through the opening for attachment elsewhere on the garment, as in the case of an adjustable length brassiere shoulder strap.

[0056] FIGS. 4-9 of female member 40 of closure 20 give, respectively, front elevation, bottom plan, left side elevation, rear elevation, cross-sections along lines 8A-8A of FIGS. 4 and 8B-8B of FIG. 7, and front and rear perspective views. Female member 40 is preferably unitarily formed by molding and comprised of a high performance polymer such as polyoxymethylene (POM) or polyamide (PA). The tensile strength of closure 20 when made in engineering plastics such as POM or PA is between about 20-30 lbs. Female member 40 generally lies in the plane F shown in FIG. 8A. When a garment including closure 20 is worn, the rear of female member 40 faces the body of the wearer. Female member 40 has a trough 42 in the rear face which is preferably oriented longitudinally and substantially parallel to and offset from female exterior side 46. Trough 42 is shaped complementary to a bar 32 of male member 30 (see discussion of FIGS. 10-13), so that trough 42 may receive bar 32 of male member 30. Female member 40 also has one or more flat rear surfaces 44 which adjoin and at least partially surround trough 42. Female member 40 has a female front surface 49 which may have various shapes such as rectangular or ovate, and may include various decorations or logos.

[0057] FIGS. 10-13 of male member 30 of closure 20 give, respectively, front elevation, cross-sections along lines 11-11 and 12-12 of FIG. 10, and front perspective views. Male member 30 is preferably unitarily formed in the manner and of materials as described above for female member 40. Male member 30 generally lies in the plane M shown in FIG. 12. Male member 30 has a bar 32 which is preferably oriented longitudinally and substantially parallel to and offset from male exterior side 36. Bar 32 is shaped to be received in trough 42 of female member 40. In the shown embodiment, bar 32 has two ends and each end terminates in a ball 33. Ball as used herein means a rounded protuberance. The diameter of ball 33 is preferably greater than the thickness of bar 32, in other words the ends of bar 32 are enlarged. In another embodiment, bar 32 has a ball 33 at only one end. Each ball 33 corresponds to a complimentary shaped concave region 43 on the ends of female trough 42. The rear of male member 30 faces the body of the wearer when worn. Male member 30 has one or more flat front surfaces 34 located between male exterior side 36 and bar 32. Bar 32 of male member 30 may have various shapes including cylindrical, rectangular, polygonal, or of tapered width as shown in FIG. 11.

[0058] FIGS. 14A and 14B are cross-sectional views of male member 30 and female member 40 in partially coupled states. Cross-sections of members 30 and 40 are as shown in FIGS. 8A and 12. To couple male and female members 30 and 40, the members are oriented such that planes M and F are substantially transverse and bar 32 of the male is aligned with trough 42 of the female. Bar 32 is inserted into trough 42, and one or both of the closure members are rotated until planes M and F are substantially coplanar; ends 510 and 520 of garment 500 are thereby connected. When closure 20 is fully closed, flat rear surface 44 of female member 40 contacts flat front surface 34 of male member 30 (see also FIG. 17D). Flat rear surface 44 of female member 40 allows